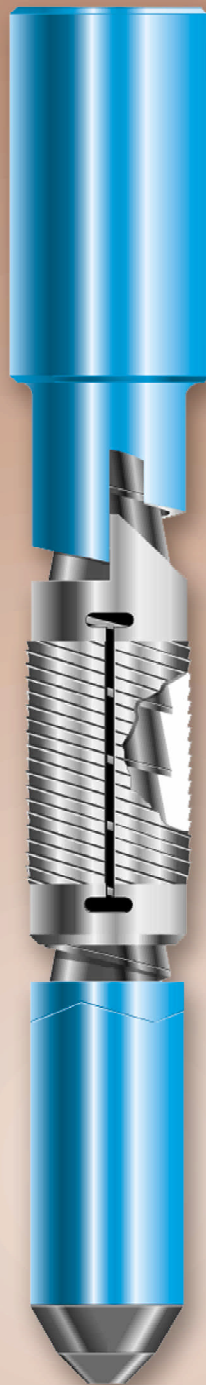


ITCO TYPE RELEASING SPEARS

Instruction Manual 2300



Itco Type Releasing Spears



Itco Type Releasing Spears

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The designs and specifications for the tools described in this instruction manual were in effect at the time this manual was approved for printing. National Oilwell Varco, whose policy is one of continuous improvement, reserves the right to discontinue models at any time, or to change designs and specifications without notice or without incurring obligation.

Twentieth Printing, September 2005

General Description

The **Bowen Itco Type Releasing Spear** is a superior fishing spear which is designed to assure positive internal engagement with the fish. It is ruggedly built to withstand severe jarring and pulling strains. It engages the fish over a large area without damage to, or distortion of the fish. The simple design eliminates any small parts which could become lost or damaged in the hole. If the fish cannot be pulled, the spear may easily be released and disengaged.

Use

The Bowen Itco Type releasing Spear is used to internally engage and to retrieve all sizes of tubing, drill pipe and casing. It may be used in conjunction with cutters, spear pack-offs and other tools, where this is desirable.

Construction

The Bowen Itco Type Releasing Spear consists of a Mandrel, Grapple, Release Ring and Nut. The Mandrel may be ordered in either a Flush Type or a Shoulder Type. Mandrel top connections are furnished to order.

The flexible one-piece Grapple has an internal helix matching the Mandrel helix. The tang of the Grapple rests against a stop on the Mandrel when the Spear is in the engaged position. The large engaging surface of the Grapple permits heavy jarring and pulling strains without distorting the fish.

The helix of the Mandrel ends at the point where the Release Ring is mounted. The cam of the Release Ring matches the cam on the face of the Nut. The matching cams of the Release Ring and the Nut are a safety device which resists locking, freezing or jamming of the Spear, assuring an easy release.

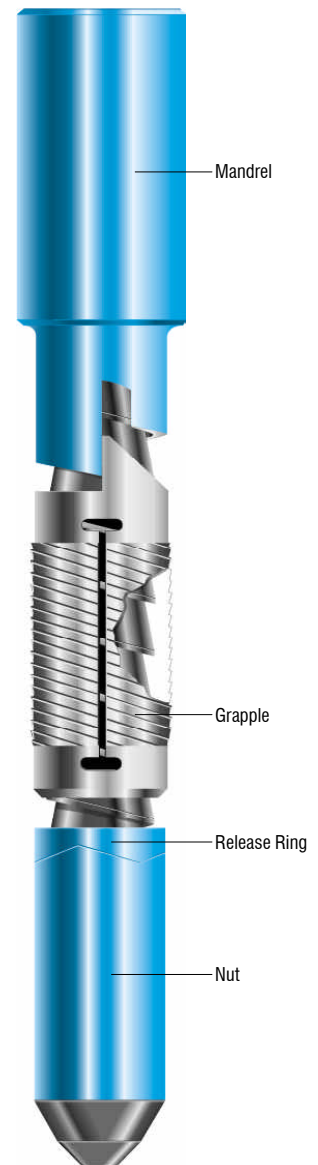
The standard plain bull-nose nut is furnished on the tool when ordered unless an alternate type is specified. Also available as accessory items at extra cost are Mill Type, Sub Type and Side-hill Type nuts.

Heavy Duty Itco Type Releasing Spears

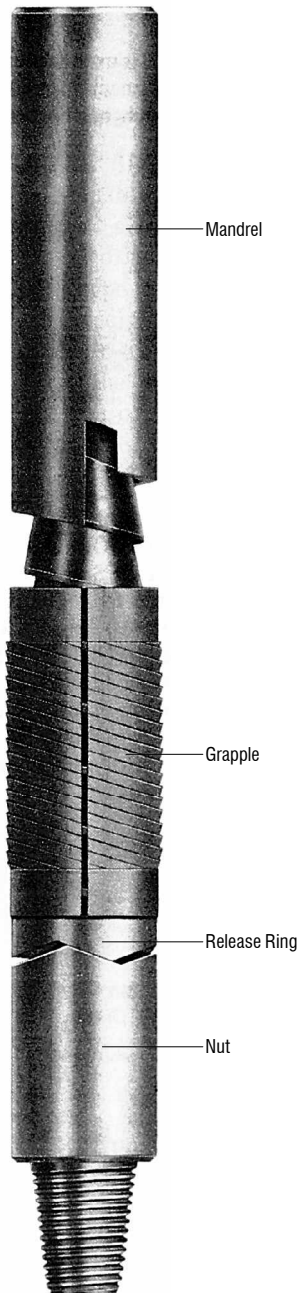
Bowen Heavy Duty Itco Type Releasing Spears have a relatively longer Mandrel and Grapple than the Standard Spear resulting in twice as much supported wickered area in engagement with the fish. These assemblies are listed, along with the standard assemblies, in the specifications found below in this manual.

The Heavy Duty Itco Type Spear is intended for use in situations where swelling of the fish is a problem. This spear, which has a much longer mandrel and grapple, distributes the swelling forces over a greater area and thus substantially reduces these forces. While the tensile strength of the mandrel is the same as the standard spear, the Heavy Duty Spear is far less prone to damage from swelling of the fish and is actually much stronger in this sense.

Since the swelling forces being delivered to the fish vary with grapple size, type of lubrication used, straight pull or jarring, etc.; it is very difficult to provide meaningful strength data for each condition. While such calculations are possible, it would mean providing a different strength for each casing or tubing size, weight, and material grade for each spear size. Since it would require many pages of published data, many hours of calculations, many assumptions regarding coefficient of friction and condition of casing, we have never attempted to provide such data.



Shoulder Type in Engaging Position



Flush Type Spear in Relasing Position
(with Sub Type Nut)

The published data is the pull load necessary to break the mandrel at the root of the spirals. This published strength has no bearing on the more common mode of failure which occurs when the grapple "jumps" and causes damage to the outer spiral diameter of the mandrel. This type of incident is the result of the fish swelling and allowing the grapple to keep moving down the mandrel until it finally "jumps" over the spiral or concentrates the load on a very small spiral area and causes damage in the process. The likelihood of this problem occurring increases as the grapple size increases on any given spear. For example, a No. 9281 spear is more likely to be damaged when catching 13³/₈" casing than when catching 9⁵/₈" casing.

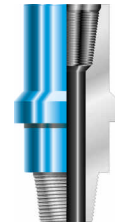


Standard Duty
Itco Spear



Heavy Duty
Itco Spear

Accessories



Type F Stop Sub

Type F Stop Subs

The Type F Stop Sub is designed to be used with the Flush Mandrel Type Bowen Relasing Spear when use of a stop is desirable. It is installed in the box connection at the top of the Mandrel.



Type S Oversize Stop Ring

Type S Oversize Stop Rings

The Type S Oversize Stop Ring is designed to be used with the Shoulder Mandrel type Bowen Releasing Spear when use of a larger stop is desirable. It is installed on the Spear shoulder with set screws.



Mill Type Nut

Mill Type Nut

The Mill Type Nut is used in place of the standard bullnose nut to mill away the distorted end of a fish to insure entrance of the Spear into the fish. It is also effective for drilling out a sand-plugged fish.



Sidehill Type Nut

Sidehill Type Nut

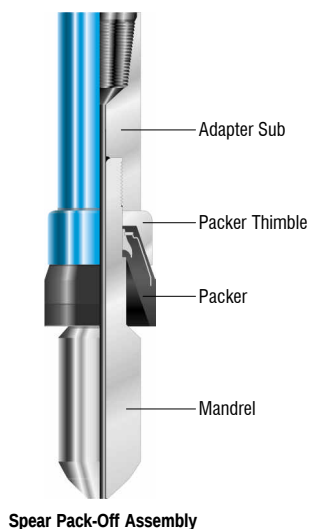
The Sidehill Type Nut is used in place of the standard bullnose nut to align the Spear with a fish that is imbedded in the side wall of the hole.



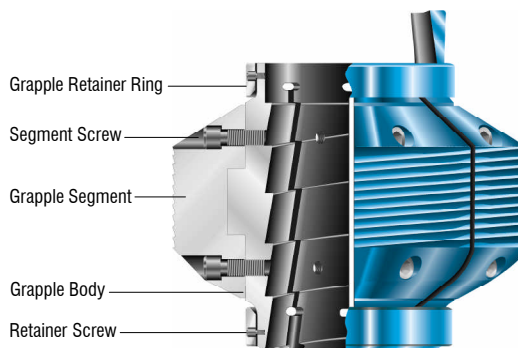
Sub Type Nut

Sub Type Nut

The Sub Type Nut is used in place of the standard bullnose nut to provide the connection required to utilize other tools below the Spear, such as the Spear Pack-Off or Internal Cutters.



Spear Pack-Off Assembly



Segment-Type Spear Grapple Assembly
for 8-5/8 Casing Spear, Part No. 9380

Segment-Type Spear Grapple Assembly

The Segment-Type Spear Grapple is used in place of the standard one-piece Grapple on the 8⁵/₈" and 9⁵/₈" size Spears to convert them to Spears capable of engaging up to 20" casing. The Segment Type Spear Grapple consists of a Grapple Body, eight grapple segments and 16 Grapple Segment Screws. The helix of the Grapple Body matches the helix of the Spear Mandrel making the action of the Spear the same as with the standard Grapple.

Spear Pack-Off Assembly

The Spear Pack-Off Assembly is attached to the Sub Type Nut below the Spear to pack off the fish in order to circulate through the fish. The Spear Pack-Off Assembly consists of an Adapter Sub, Packer Thimble, Packer and Mandrel. The Adapter Sub of the Spear Packoff will be furnished with a box connection to match the pin connection of the Sub Type Nut on which it is to be used, or as otherwise ordered. The Mandrel of the Spear Pack-Off may be ordered plain bullnose or with a pin connection for attachment of other tools, as specified.

Bowen Internal Cutters For Use in Cut and Pull Operations

Bowen Internal Cutters may be run below the Bowen Releasing Spear and are spaced as desired, depending upon the length of the fish and the length of the cut to be made. The Spear should be spaced far enough above the cutter so that the Spear is clear of the fish during cutting operations. After cutting is completed, the Spear can be lowered to retrieve the cut-off section. Bowen Internal Cutters are fully described in Instruction Manual No. 5600.

Operation

Examine and assure that the Bowen Releasing Spear is the correct size for the pipe to be caught and is properly assembled. Refer to the Specification Chart and to the Grapple Range Chart in this manual.

Connect the Spear to the fishing string. Set the Spear in released position by screwing the Grapple down the helix against the Release Ring as far as it will go by hand. In this position the Grapple is caused to contract inward and will not engage the pipe as it is run in.

To Engage and Pull the Fish

Lower the fishing string slowly until the Spear has entered the fish to the desired depth. Rotate one full turn to the left, then pull the fish by elevating the fishing string.

As the fishing string is rotated to the left, it turns the Mandrel down through the Grapple, putting the Grapple in engaging position.

A straight pull will then wedge the Grapple into positive engagement with the fish.

To Release from the Fish

Bump down with the weight of the fishing string to break the engagement; rotate two to three turns to the right, then elevate the string until the Spear is clear of the fish.

This moves the Mandrel upward through the Grapple, forcing the Grapple down against the Release Ring and putting the Spear in the released position. If the Spear does not release, bump down; then simultaneously rotate to the right while slowly elevating the fishing string until the Spear is clear of the fish.

Operation with Accessories

The Bowen Itco Type Releasing Spear, when being run alone, is assembled with a standard bullnose Nut. If a positive stop is desired, use either a Shoulder Type Spear Mandrel, a Type F Stop Sub with the Flush type Mandrel, or a Type S Oversize Stop Ring (on either the Type F Stop Sub or Shoulder type mandrel).

Mill Type Nut

If the top of the fish is distorted or plugged in any manner that would prevent easy entry of the Spear into the fish, install a Mill Type Nut in place of the Bullnose Nut.

When the top of the fish is reached, rotate slowly to the right and slowly lower the Spear into the fish until mill has cleaned burrs from top of fish and then lower into the fish to the desired depth. Sidehill Type Nut

If the top of the fish is out of line with the well bore or is imbedded in the sidewall, install a Sidehill Type Nut in place of the bullnose Nut.

When the top of the fish is reached, the fishing string must be lowered, elevated, rotated a portion of a turn and lowered repeatedly until the leading edge of the Sidehill Type Nut encounters the section of the top of the fish that overlaps the well bore, and directs the Spear into the fish.

Sub Type Nut

If it is desired to run a Spear Pack-Off Assembly or an Internal Cutter below the Spear, install a Sub Type Nut in place of the bullnose Nut.

Spear Pack-Off Assembly

In order to circulate through the fish, install the proper size Spear Pack-Off Assembly on the Sub Type Nut of the Spear.

After the Spear has entered and engaged the fish, begin flow with the circulation pumps while maintaining a heavy upward strain on the fish. The fluid passing through the Adapter Sub and Mandrel backs up against the Packer, causing a positive seal on the inside of the fish. This will add lifting power to the pulling force applied to the fishing string, while at the same time begin a break-down of the sediment or formation between the fish and the walls of the well bore, freeing the fish.

Internal Cutter

When it is desired to run an Internal Cutter below the Spear, a Sub Type Nut is installed in place of the bullnose Nut. Sufficient pipe is made up between the Internal Cutter and the Spear to enable the Spear to remain above the fish during the cutting operation. After the cut has been completed, the Spear is lowered into the cut-off section to retrieve it.

Precautions

In deep or crooked holes, it may be necessary to rotate the fishing string more than one full turn, to set or release the Spear. Moderate additional rotation is not harmful to the operation, or to the Spear.

During operation, always maintain a moderate upward strain on the fishing string when rotating either right-hand or left-hand.

Always bump down with the full weight of the fishing string before the releasing operation.

Maintenance

After each use, the Bowen Itco Type Releasing Spear should be completely disassembled, thoroughly cleaned, inspected for signs of damage or advanced wear, lubricated and reassembled. If the tool is to be stored, the exterior surface should be greased or painted, after assembly.

Disassembly

1. Secure the Spear in a suitable vise, clamping on the (upper) tool Joint end.
2. Loosen and remove the Nut (or Spear Pack-Off Assembly).
3. Slide the Release Ring off the Mandrel.
4. Remove the Grapple by screwing it down the helix. Use right-hand rotation.

5. Clean all the parts thoroughly.
Examine and replace any damaged or badly worn parts.

Reassembly

1. Secure the Mandrel in a vise, clamping it near the upper end.
2. Apply a heavy coat of grease to the helix of the Mandrel.
3. If the Grapple is large, grease the interior, and install it on the Mandrel. Screw it on, using left-hand rotation.
4. Install the Release Ring with the cammed face downward (facing the Nut).
5. Apply thread dope or lubricant to the threads and assemble the Nut on the Mandrel lower end. Buck it up tight.
6. Screw the Grapple down the helix until it rests against the Release Ring (and Nut).
7. Paint or lubricate the exterior surfaces to prevent rust or deterioration.

Maintenance of Spear Pack-Off

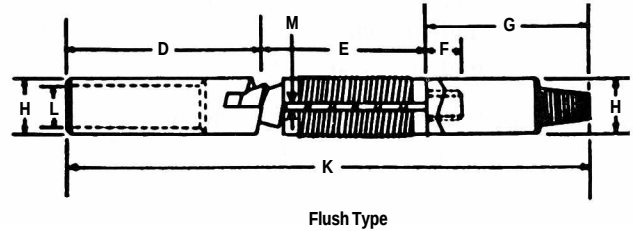
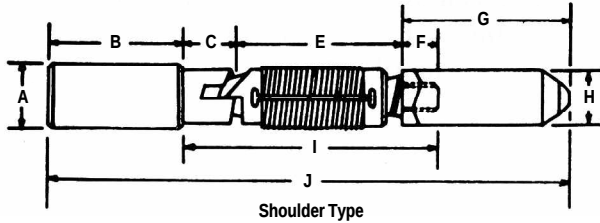
The Spear Pack-Off Assembly should be disassembled, cleaned and re-assembled after each use. Disassembly should proceed as follows:

Disassembly of Spear Pack-Off

1. Secure the assembly in a suitable vise, clamping on the lower end of the Mandrel.
2. Loosen and remove the Adapter Sub.
3. Slide off the Packer Thimble.
4. Remove the Packer.
5. Thoroughly clean all the parts. Examine the Packer carefully. If it is worn or damaged, replace it with a new Packer.

Reassembly of Spear Pack-Off

1. Secure the Mandrel in a vise, clamping it on the lower end.
2. Slide the Packer onto the Mandrel. Make sure that it seats properly on the shoulder of the Mandrel, and that the large open end faces downward, (toward the fish).
3. Slide the Packer Thimble over the Mandrel and onto the Packer. Force it down tightly around the upper end of the Packer.
4. Apply thread dope or grease to the threads and assemble the Adapter Sub onto the Mandrel. Buck the Sub up tight.
5. Paint or lubricate the exterior metal parts of the assembly. Do not paint or lubricate the rubber Packer. Paint, solvents, sunlight and most lubricants are harmful to rubber products when the rubber is exposed to them for long periods of time.



Principal Dimensions for Releasing Spears

Spear Assy. No.	Spear Size (inches)	Class	I.D.	A	B	C	D	E	F	G	H	I	J	K	L	M
						Shoulder Type Only	Flush Type Only							Flush Type Only	Flush Type Only	
16455	1.050 O.D.Pipe	Standard	—	1-1/2	4-1/8	6	—	2-3/8	7/8	2-3/8	11/16	9-5/8	15-1/4	—	—	3/16
19350	1.313 O.D.Pipe	Standard	—	1-5/8	3	3	—	3-5/16	1-3/8	2-1/2	15/16	7-11/16	11-13/16	—	—	1/4
11195	1.660 O.D.Tubing	Standard	—	1-13/16	3	3	3-25/32*	3-5/16	1-3/8	2-1/2	1-1/8	7-11/16	11-13/16	—	—	3/8
35841	1.660 O.D.Tubing	Standard L.H.	—	1-13/16	3	3	3-25/32*	3-5/16	1-3/8	2-1/2	1-1/8	7-11/16	11-13/16	—	—	3/8
9915	1.900 O.D.Tubing	Standard	—	2-1/2	5	3	7	5-1/16	2-1/4	5-5/8	1-3/8	10-5/16	18-11/16	—	—	7/16
9645	2-3/8 O.D.Drill Pipe	Standard	—	3-1/8	7	3	7	5-29/32	2-1/4	6-17/32	1-11/16	—	—	19-7/16	—	5/8
17470	2-3/8 O.D.Drill Pipe	Heavy Duty	—	3-1/8	7	3	7	9	2-1/4	6-5/8	1-11/16	14-1/4	25-5/8	22-5/8	—	5/8
1344	2-3/8 O.D.Tubing	Standard	3/8	3-1/8	7	3	7	6-3/4	2-1/4	6-5/8	1-7/8	12	23-3/8	23-3/8	—	5/8
17228	2-3/8 O.D.Tubing	Heavy Duty	3/8	3-1/8	7	3	7	9	2-1/4	6-5/8	1-7/8	14-1/4	25-5/8	22-5/8	—	5/8
1227	2-7/8 O.D.Tubing	Standard	3/8	3-3/4	7	3	7-1/4	6-3/4	2-1/2	7	2-5/16	12-1/4	23-3/4	21	—	5/8
17231	2-7/8 O.D.Tubing	Heavy Duty	3/8	3-3/4	7	3	7-1/4	9	2-1/2	7	2-5/16	14-1/2	26	23-1/4	—	5/8
18820	2-7/8 O.D.Tubing	Heavy Duty L.H.	3/8	3-3/4	7	3	7-1/4	9	2-1/2	7	2-5/16	14-1/2	26	23-1/4	—	5/8
9410	3-1/2 O.D.Tubing	Standard	1/2	3-3/4	7	3-1/2	10-1/2	12	3-1/2	9	2-13/16	19	31-1/2	32-1/2	—	5/8
9945	3-1/2 O.D.Drill Pipe	Heavy Duty	1/2	3-3/8	7	3-1/2	10-1/2	9-3/4	3-5/8	8-1/8	2-1/2	16-5/8	31-1/8	—	—	5/8
530	4 O.D.Tubing	Light Duty	3/4	3-3/4	7-1/2	3	10-3/8	8-1/8	2-1/2	8	3-1/4	13-5/8	26-5/8	26-1/2	—	5/8
9485	4 O.D.Tubing	Standard	3-1/4	4-1/8	7-1/2	3	10-1/2	12	3-1/2	9	3-1/4	18-1/2	31-1/2	31-1/2	—	5/8
13200	4-1/2 O.D.Tubing	Light Duty	3/4	4-1/2	8	3-1/2	3-3/4	9-3/4	3-1/2	10-3/4	3-5/8	16-3/4	32	32	—	1
17475	4-1/2 O.D.Tubing	Standard	3/4	4-1/2	8	3-1/2	11	14-1/4	3-1/2	10	3-5/8	21-1/4	35-3/4	33-3/4	—	3/4
1332	5 O.D.Casing	Light Duty	7/8	4-3/8	8	3-1/2	9-1/2	9-3/4	3-1/2	10-5/8	4-1/32	16-3/4	31-7/8	29-7/8	—	13/16
9680	5 O.D.Casing	Standard	7/8	5	8	3-1/2	12	14-1/4	3-1/2	10-5/8	4-1/32	21-1/4	36-3/8	36-7/8	—	13/16
18270	5 O.D.Casing	Heavy Duty	7/8	5	8	3-1/2	12	14-1/4	3-1/2	10	4-1/32	21-1/4	36-3/8	36-7/8	—	1
20115	5 O.D.Casing	Standard L.H.	7/8	5	8	3-1/2	12	14-1/4	3-1/2	10-5/8	4-1/32	21-1/4	36-3/8	36-7/8	—	13/16
9715	6 O.D.Casing	Light Duty	1	6	8	5-1/2	12	13	3-1/2	12	5	16-3/8	39-3/16	37-11/16	3-5/16	1-1/4
17234	6 O.D.Casing	Standard	1	6	8	5-1/2	12	19	3-1/2	12	5	16-3/8	—	43	3-5/16	1-1/4
9266	7 O.D.Casing	Standard	2	7	10	6-1/2	16-1/2	14-5/8	3-1/2	12-3/4	5-11/16	—	—	40-1/4	3-1/2	1-5/8
20890	7 O.D.Casing	Standard L.H.	2	7	10	6-1/2	12-7/8	14-5/8	3-1/2	12-3/4	5-11/16	—	—	40-1/4	3-1/2	1-5/8
17237	7 O.D.Casing	Heavy Duty	2	7	10	6-1/2	13-1/2	21-3/8	3-1/2	12-3/4	5-11/16	31-3/8	53-3/8	47	3-1/2	1-5/8
9572	8 O.D.Casing	Light Duty	2	8	10	6-1/2	20-7/8	14-5/8	4-1/2	13-3/4	6-15/16	—	—	49-1/4	5-3/4	1-5/8
17240	8 O.D.Casing	Heavy Duty	2-3/4	8	—	7	—	—	3-3/4	13	7-1/4	—	—	—	—	—
9380	8-5/8 O.D.Casing	Standard	2-3/4	8-5/8	14	7	20-7/8	14-5/8	4-1/2	13-3/4	7-1/4	26-1/8	53-7/8	49-1/4	5	1-5/8
17243	8-5/8 O.D.Casing	Heavy Duty	2-3/4	8-5/8	—	—	20-7/8	21-3/8	4-1/2	13-3/4	7-1/4	—	—	56	5-3/4	1-5/8
20895	8-5/8 O.D.Casing	Standard L.H.	2-3/4	8-5/8	—	—	20-7/8	14-5/8	4-1/2	13-3/4	7-1/4	—	—	49-1/4	5-3/4	1-5/8
9281	9-5/8 O.D.Casing	Standard	2-13/16	9-5/8	15-3/8	7	20-7/8	14-5/8	3-1/2	14	8-1/4	25-1/8	51	49-1/4	6-1/4	1-5/8
20120	9-5/8 O.D.Casing	Standard L.H.	2-3/4	9-5/8	—	—	20-7/8	14-5/8	3-1/2	13-3/4	8-1/4	—	—	49-1/4	6-1/4	1-5/8
17246	9-5/8 O.D.Casing	Heavy Duty	2-13/16	9-5/8	—	—	20-7/8	21-3/8	3-1/2	13-3/4	8-1/4	—	—	56	6-1/4	1-5/8
27780	13-3/8 O.D.Casing	Standard	3-1/2	13-3/8	17-7/8	7	22-3/8	16-7/8	3-1/2	12	11-3/4	27-3/8	53-3/4	51-1/4	7-3/4	1-5/8

* Without Sub

Specifications

Nominal Catch Size		1.050	1.313	1.660	1-1/4	1.900	2-3/8	2-3/8	2-3/8	2-3/8	2-3/8	2-3/8	2-7/8
		O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	Tubing	O.D.	O.D.	O.D.	O.D.
		Pipe	Pipe	Pipe	Pipe	Pipe	Pipe	Pipe	Drill Pipe	Tub.	Tub.	Tub.	Tub.
Additional Catch Size		All	All	All	All	All	All	All	All	2-7/8	2-7/8	2-7/8	3-1/2
		Weights	Weights	Weights	Weights	Weights	Weights	Weights	Weights	D.P.	D.P.	D.P.	D.P.
										2-7/8	2-7/8	2-7/8	3-1/2
										Tub.	Tub.	Tub.	Tub.
Spear O.D. (H)		11/16	7/8	1-1/8	1-1/8	1-3/8	1-11/16	1-11/16	1-11/16	1-7/8	1-7/8	1-7/8	2-5/16
Spear I.D.										3/8	3/8	3/8	3/8
Class		Std.	Std.	Std.	Std.	Std.	Std.	Std.	Heavy	Std.	Std.	Heavy	Std.
					LH.			LH.	Duty	LH		Duty	
Complete Assembly	Part No.	16455	19350	11195	35841	9915	9645	74509	17470	42069	1344	17228	1227
	Weight	6	8	9	9	10	12	12	19	14	14	29	24

Replacement Parts

Flush Type Mandrel	Part No.	16456*	19351*	11196*	35842	9916	9646	74554	17471	42070	1345	17229	1231
	Weight	3-3/4	4-1/2	5	5	6	7	7	9	8	8	16	14
Shoulder Type Mandrel (A)	Part No.	16456	19351	11196	35842	9916	9646	74554	17471	42070	1345	17229	1231
	Weight	4	5	6	6	9	11	11	10	16	16	23	22
Grapple	Part No.	16457	19352	11197	35843	9917	9647	74555	17472	42071	1348	17230	1230
(for Weights and Catch Ranges, see Calculated Strength Chart)													
Release Ring	Part No.	16458	19353	11198	35844	9918	9649	74557	9649	42072	1347	1347	1229
	Weight	1/8	1/8	1/8	1/8	1/8	1/4	1/4	1/4	1/4	1/4	1/4	1/2
Bullnose Nut	Part No.	16459	19354	11199	35845	9919	9648	74556	9648	42073	1346	1346	1228
	Weight	2	2	2	2	2	3	3	3	4	4	4	7

Accessories

Mill Type Nut	Part No.	16459-A	19354-A	11199-A	35845-A	9919-A	9648-A	74556-A	9648-C	42073-A	1346-A	1346-A	1228-A
	Weight	2	2	2	2	2	3	3	3	4	4	4	7
Sub Type Nut	Part No.	16459-B	19354-B	11199-B	35845-B	9919-B	9648-B	74556-B	9648-C	42073-A	1346-B	1346-B	1228-B
	Weight	2	2	2	2	2	3	3	3	4	4	4	7
Side Hill Type Nut	Part No.	16459-C	19354-C	11199-C	35845-C	9919-C	9648-C	74556-C	9648-C	42073-A	1346-C	1346-C	1228-C
	Weight	2	2	2	2	2	3	3	3	4	4	4	7

Stop Subs - Stop Rings

Stop Sub Body O.D.		—	—	—	—	—	1-11/16	1-11/16	1-11/16	1-7/8	1-7/8	1-7/8	2-5/16
Stop Sub Stop O.D.		—	—	—	—	—	3-1/8	3-1/8	3-1/8	3-1/8	3-1/8	3-1/8	3-3/4
Stop Ring O.D.		—	—	—	—	—	3-5/8	3-5/8	3-5/8	3-5/8	3-5/8	3-5/8	4-1/2
Stop Sub Type F	Part No.	—	—	—	—	—	19050	19050	19050	19051	19051	19051	19052
Stop Ring Type S	Part No.	—	—	—	—	—	18809	18809	18809	18809	18809	18809	18800

* Optional two-piece mandrel

How to Order

Specify:

- (1) Name and part number of assembly or part
- (2) Size and type of top connection
- (3) Size and weight or weights of pipe to be caught
- (4) Flush or shoulder type
(specify O.D. of shoulder – A)
- (5) Mandrel length desired (C)
- (6) Thread size and type of nut, if wanted
See page 8 for dimensions

RECOMMENDED SPARES:

- (1) 2 Grapples for Each Catch Size

How to Order Type F Stop

Specify:

- (1) O.D. of Stop Sub Body
- (2) Length from Stop to thread connection
- (3) Top and bottom connection desired
- (4) Number of spear on which Stop Sub will be used

How to Order Type S Stop Ring

Specify:

- (1) O.D. of Ring
- (2) O.D. on Spear shoulder or Stop Sub shoulder with which Stop Ring is to be used

Specifications

Nominal Catch Size		2-7/8	2-7/8	2-7/8	2-7/8	2-7/8	3-1/2	3-1/2	4 O.D.	4 O.D.	4-1/2	4-1/2
		O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	Tubing	Tubing	O.D.	O.D.
		Tubing	Tubing	Tubing	Tubing	Tubing	Tubing	Drill Pipe		Tubing	Tubing	
Additional Catch Size		3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4 O.D.	4 O.D.	4-1/2	4-1/2	4-1/2,	4-1/2,
		D.P.	D.P.	D.P.	D.P.	D.P.	Tubing	Tubing	&5	&5	4-3/4,	4-3/4,
		3-1/2	3-1/2	3-1/2	3-1/2	3-1/2			Casing	Casing	&5	&5
		Tubing	Tubing	Tubing	Tubing	Tubing					Casing	Casing
Spear O.D. (H)		2-5/16	2-5/16	2-5/16	2-5/16	2-5/16	2-13/16	2-1/2	3-1/4	3-1/4	3-5/8	3-5/8
Spear I.D.		3/8	3/8	3/8	3/8	3/8	1/2	1/2	3/4	3/4	3/4	3/4
Class		Std.	Std.	H.D.	Heavy	Heavy	Std.	Heavy	Light	Std.	Light	Std.
		L.H.T.	L.H.	L.H.	Duty	Duty	L.H.	Duty	Duty		Duty	
Complete Assembly	Part No.	62242	62198	195015	17231	18820	9410	9945	530	9485	13200	17475
	Weight	24	24	37	37	37	50	63	50	68	45	95

Replacement Parts

Mandrel – Flush Type	Part No.	62243	62199	145016	17232	18821	9411	9946	531	9486	13201	17476
	Weight	14	14	20	20	20	28	31	28	42	58	58
Mandrel – Shoulder Type (A)	Part No.	62243	62199	145016	17232	18821	9411	9946	531	9486	13201	17476
	Weight	22	22	28	28	28	32	38	28	46	65	67
Grapple	Part No.	1230	49888	145017	17233	18822	9412	9947	532	9487	13202	17477
(for Weights and Catch Ranges, see Calculated Strength Chart)												
Release Ring	Part No.	1229	1229	1229	1229	18823	1584	9948	534	534	13183	13183
	Weight	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4	3/4	7/8	7/8
Bullnose Nut	Part No.	62200	62200	145018	1228	18824	9413	9949	533	9488	13184	13184
	Weight	7	7	7	7	7	14	16	14-1/2	16-1/2	24	24

Accessories

Mill Type Nut	Part No.	62200-A	62200-A	145018-A	1228-A	18824-A	9413-A	9949-A	533-A	9488-A	13184-A	13184-A
	Weight	7	7	7	7	7	14	16	16	16	24	24
Sub Type Nut	Part No.	62200-B	62200-B	145018-B	1228-B	18824-B	9413-B	9949-B	533-B	9488-B	13184-B	13184-B
	Weight	7	7	7	7	7	14	16	16	16	24	24
Side Hill Type Nut	Part No.	62200-C	62200-C	145018-C	1228-C	18824-C	9413-C	9949-C	533-C	9488-C	13184-C	13184-C
	Weight	7	7	7	7	7	14	16	16	16	24	24

Stop Subs - Stop Rings

Stop Sub Body O.D.		2-5/16	2-5/16	2-5/16	2-5/16	2-5/16	2-13/16	2-13/16	3-1/4	3-1/4	3-3/4	3-3/4
Stop Sub Stop O.D.		3-3/4	3-3/4	3-3/4	3-3/4	3-3/4	3-3/4	3-3/4	4-1/8	4-1/8	4-1/2	4-1/2
Stop Ring O.D.		4-1/2	4-1/2	4-1/2	4-1/2	4-1/2	4-1/2	4-1/2	4-3/4	4-3/4	5	5
Stop Sub Type F	Part No.	19052	19052	19052	19052	19052	19053	19053	19054	19054	19055	19055
Stop Ring Type S	Part No.	18800	18800	18800	18800	18800	18801	18801	18802	18802	18803	18803

How to Order

Specify:

- (1) Name and part number of assembly or part
- (2) Size and type of top connection
- (3) Size and weight or weights of pipe to be caught
- (4) Flush or shoulder type
(specify O.D. of shoulder – A)
- (5) Mandrel length desired (C)
- (6) Thread size and type of nut, if wanted
See page 8 for dimensions

RECOMMENDED SPARES:

- (1) 2 Grapples for Each Catch Size

How to Order Type F Stop

Specify:

- (1) O.D. of Stop Sub Body
- (2) Length from Stop to thread connection
- (3) Top and bottom connection desired
- (4) Number of spear on which Stop Sub will be used

How to Order Type S Stop Ring

Specify:

- (1) O.D. of Ring
- (2) O.D. on Spear shoulder or Stop Sub shoulder with which Stop Ring is to be used

Specifications

Nominal Catch Size		5	5	5	5	6	6	6	7	7	7
		O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.
		Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing
Additional Catch Size		5-1/2,	5-1/2,	5-1/2,	5-1/2,	6-5/8	6-5/8	6-5/8	7-5/8,	7-5/8,	7-5/8,
		5-3/4,	5-3/4,	5-3/4,	5-3/4,	& 7	& 7	& 7	8, &	8, &	8, &
		& 6	& 6	& 6	& 6	Casing	Casing	Casing	8-1/8	8-1/8	8-1/8
		Casing	Casing	Casing	Casing				Casing	Casing	Casing
Spear O.D. (H)		4-1/32	4-1/32	4-1/32	4-1/32	5	5	5	5-11/16	5-11/16	5-11/16
Spear I.D.		7/8	1	1	7/8	1	1	1	2	2	2
Class		Light	Std.	Std.	Light	Light	Std.	Std.	Std.	Std.	Heavy
		Duty		L.H.	Duty, L.H	Duty		L.H.		L.H.	Duty
Complete Assembly	Part No.	1332	9680	18270	20115	9715	17234	58292	9266	20890	17237
	Weight	110	115	175	117	150	186	186	241	241	310

Replacement Parts

Mandrel – Flush Type	Part No.	1333	9681	18271	20116	9716	17235	58293	9267	20891	17238
	Weight	65	72	85	73	110	118	118	141	141	205
Mandrel – Shoulder Type (A)	Part No.	1333	9681	18271	20116	9716	17235	58293	9267	20891	17238
	Weight	67	77	91	80	115	123	123	146	146	214
Grapple	Part No.	1334	9682	18272	20117	9717	17236	58294	9268	20892	17239
(For weights and catch ranges, see Calculated Strength Chart.)											
Release Ring	Part No.	1336	1336	20119	20119	9718	9718	9718	9279	152677	9279
	Weight	1	1	1	1	2	2	2	3-1/2	3-1/2	3-1/2
Bullnose Nut	Part No.	1335	1335	20118	20118	9719	9719	58295	9269	20893	9269
	Weight	28	28	28	29	48	48	48	65	65	65

Accessories

Mill Type Nut	Part No.	1335-A	1335-A	1335-A	20118-A	9719-A	9719-A	58295-A	9269-A	20893-A	9269-A
	Weight	28	28	28	29	48	48	48	65	65	65
Sub Type Nut	Part No.	1335-B	1335-B	1335-B	20118-B	9719-B	9719-B	58295-B	9269-B	20893-B	9269-B
	Weight	28	28	28	29	48	48	48	65	65	65
Side Hill Type Nut	Part No.	1335-C	1335-C	1335-C	20118-C	9719-C	9719-C	58295-C	9269-C	20893-C	9269-C
	Weight	28	28	28	29	48	48	48	65	65	65

Stop Subs - Stop Rings

Stop Sub Body O.D.		4-1/32	4-1/32	4-1/32	4-1/32	5	5	5	5-11/16	5-11/16	5-11/16
Stop Sub Stop O.D.		5	5	5	5	6	6	6	7	7	7
Stop Ring O.D.		5-1/2	5-1/2	5-1/2	5-1/2	6-5/8	6-5/8	6-5/8	7-5/8	7-5/8	7-5/8
Stop Sub Type F	Part No.	19056	19056	19056	19056	19057	19057	19057	19058	19058	19058
Stop Ring Type S	Part No.	18804	18804	18804	18804	18805	18805	18805	18806	18806	18806

How to Order

Specify:

- (1) Name and part number of assembly or part
- (2) Size and type of top connection
- (3) Size and weight or weights of pipe to be caught
- (4) Flush or shoulder type
(specify O.D. of shoulder – A)
- (5) Mandrel length desired (C)
- (6) Thread size and type of nut, if wanted
See page 8 for dimensions

RECOMMENDED SPARES:

- (1) 2 Grapples for Each Catch Size

How to Order Type F Stop

Specify:

- (1) O.D. of Stop Sub Body
- (2) Length from Stop to thread connection
- (3) Top and bottom connection desired
- (4) Number of spear on which Stop Sub
will be used

How to Order Type S Stop Ring

Specify:

- (1) O.D. of Ring
- (2) O.D. on Spear shoulder or Stop Sub shoulder
with which Stop Ring is to be used

Specifications

Nominal Catch Size	8	8	8-5/8	8-5/8	8-5/8	9-5/8	9-5/8	9-5/8	9-5/8	13-3/8	
	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	O.D.	
	Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing	
Additional Catch Size	8-1/8,	8-1/8,	9	9	9	10-3/4	10-3/4	10-3/4	10-3/4	16	
	8-5/8, &	8-5/8, &	Thru	Thru	Thru	Thru	Thru	Thru	Thru	Thru	
	9-5/8	9-5/8	13-3/8	15-3/8	15-3/8	20	20	20	20	20	
	Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing	Casing	
Spear O.D. (H)	6-15/16	7-1/4	7-1/4	7-1/4	7-1/4	8-1/4	8-1/8	8-1/4	8-1/4	11-3/4	
Spear I.D.	2	2-3/4	2-3/4	2-3/4	2-3/4	2-13/16	2-3/4	2-13/16	2-13/16	3-1/2	
Class	Light	Heavy	Std.	Heavy	Std.	Std.	Std.	Std.	Heavy	Std.	
	Duty	Duty		Duty	L.H.		L.H.	L.T.	Duty		
Complete Assembly	Part No. Weight	9572	17240	9380	17243	20895	9281	20120	81470	17246	27780
		400	438	415	400	415	558	558	558	600	750

Replacement Parts

Mandrel – Flush Type	Part No.	9573	17241	9381	17244	20896	9282	20121	81471	17247	27781
	Weight	250	325	250	250	250	344	344	344	400	510
Mandrel – Shoulder Type (A)	Part No.	9573	17241	9381	17244	20896	9282	20121	81471	17247	27781
	Weight	255	334	257	264	250	350	350	350	405	530
Grapple	Part No.	9574	17242	9382	17245	20897	9283	20122	9283	17248	27782
(For Weights and Catch Ranges, see Calculated Strength Chart.)											
Release Ring	Part No.	9575	9575	9383	9383	9383	9286	9286	9286	9286	27783
	Weight	5	5	5	5	5	5-1/2	5-1/2	5-1/2	5-1/2	6
Bullnose Nut	Part No.	9576	9576	9384	9384	20898	9284	20123	81422	9284	27784
	Weight	100	100	115	115	115	152	152	152	152	165

Accessories

Mill Type Nut	Part No.	9269-A	9576-A	9384-A	9384-A	20898-A	9284-A	20123-A	81472-A	9284-A	27784-A
	Weight	65	100	115	115	115	152	152	152	152	165
Sub Type Nut	Part No.	9269-B	9576-B	9384-B	9384-B	20898-B	9284-B	20123-B	81472-B	9284-B	27784-B
	Weight	65	100	115	115	115	152	152	152	152	165
Side Hill Type Nut	Part No.	9269-C	9576-C	9384-C	9384-C	20898-C	9284-C	20123-C	81472-C	9284-C	27784-C
	Weight	65	100	115	115	115	152	152	152	152	165

Stop Subs - Stop Rings

Stop Sub Body O.D.	—	—	7-1/4	7-1/4	7-1/4	8-1/4	8-1/4	8-1/4	8-1/4	8-1/4	11-3/4
Stop Sub Stop O.D.	—	—	8-5/8	8-5/8	8-5/8	9-5/8	9-5/8	9-5/8	9-5/8	9-5/8	13-3/8
Stop Ring O.D.	—	—	9-1/16	9-1/16	9-1/16	10-3/4	10-3/4	10-3/4	10-3/4	10-3/4	16
Stop Sub Type F	Part No.	—	—	19059	19059	19059	19049	19049	19049	19049	27871
Stop Ring Type S	Part No.	—	—	18807	18807	18807	18808	18808	18808	18808	27870

How to Order

Specify:

- (1) Name and part number of assembly or part
- (2) Size and type of top connection
- (3) Size and weight or weights of pipe to be caught
- (4) Flush or shoulder type (specify O.D. of shoulder – A)
- (5) Mandrel length desired (C)
- (6) Thread size and type of nut, if wanted. See page 8 for dimensions

RECOMMENDED SPARES:

(1) 2 Grapples for Each Catch Size

Segment Type Grapple Assembly

Fits Spear Number		9380	9380	9380	9380	17243	17243	17243	17243	20895
To Catch – Pipe Size		10-3/4	11-3/4	12-3/4	13-3/8	10-3/4	11-3/4	12-3/4	13-3/8	13-3/8
To Catch – Pipe Weight		32.75	38.00	45.45	48.00	32.75	38.00	45.45	48.60	48.60
		48.00	54.00	66.72	68.00	48.00	54.00	66.72	68.00	68.00
		40.00	47.00	—	61.00	40.00	47.00	—	61.00	61.00
		55.50	60.00	—	85.00	55.50	60.00	—	85.00	85.00
Complete Assembly	Part No.	9382	9382	9382	9382	17245	17245	17245	17245	20897
	Weight	178	189	198	197	337	350	359	382	401

Replacement Parts

Grapple Body	Part No.	9382-A	9382-A	9382-A	9382-A	17245-A	17245-A	17245-A	17245-A	20897-A
	Weight	75	75	75	75	100	100	100	100	110
Grapple Segment (8 per Set)	Part No.	9382-B	9382-B	9382-B	9382-B	17245-B	17245-B	17245-B	17245-B	20897-B
	Weight	96	112	115	120	175	100	191	220	240
Segment Screw	Part No.	12198	12198	12198	12198	12198	12198	12198	12198	12198
	No. Req'd.	16	16	16	16	32	32	32	32	16
Retainer Ring (2 Req'd.)	Part No.	56855	56855	56855	56855	56855	56855	56855	56855	56855
	Weight	4	4	4	4	4	4	4	4	4
Retainer Ring Screw (6 Req'd.)	Part No.	23535	23535	23535	23535	23535	23535	23535	23535	23535
Retainer Ring Screw Spacer (6 Req'd.)	Part No.	56979	56979	56979	56979	56979	56979	56979	56979	56979

Segment Type Grapple Assembly (Continued)

Fits Spear Number		9281	9281	9281	9281	17246	17246	17246	17246	27780
To Catch – Pipe Size		13-3/8	14	16	20	13-3/8	14	16	20	20
To Catch – Pipe Weight		48.00	42.00	55.00	90.00	48.00	42.00	55.00	90.00	90.00
		68.00	57.00	65.00	94.00	68.00	57.00	65.00	94.00	94.00
		61.00	—	—	106.00	61.00	—	—	133.00	133.00
		85.00	—	—	133.00	85.00	—	—	—	—
Complete Assembly	Part No.	9283	9283	9283	9283	17248	17248	17248	17248	27782
	Weight	197	207	216	536	392	412	430	720	800

Replacement Parts (Continued)

Grapple Body	Part No.	9283-A	9283-A	9283-A	9283-A	17248-A	17248-A	17248-A	17248-A	27782-A
	Weight	85	85	85	85	170	170	170	170	200
Grapple Segment (8 per Set)	Part No.	9283-B	9283-B	9283-B	9283-B	17248-B	17248-B	17248-B	17248-B	27782-B
	Weight	110	120	129	450	220	240	258	550	600
Segment Screw	Part No.	23020	23020	23020	23020	23020	23020	23020	23020	12019
	No. Req'd.	16	16	16	16	16	16	16	16	16
Retainer Ring (2 Req'd.)	Part No.	56409	56409	56409	56409	56409	56409	56409	56409	56858
	Weight	4-1/2	4-1/2	4-1/2	4-1/2	4-1/2	4-1/2	4-1/2	4-1/2	5
Retainer Ring Screw (6 Req'd.)	Part No.	56813	56813	56813	56813	56859	56859	56859	56859	56859
Retainer Ring Screw Spacer (6 Req'd.)	Part No.	56979	56979	56979	56979	56979	56979	56979	56979	56979

How to Order

Specify:

- (1) Name and part number of assembly or part
- (2) Size and type of top connection
- (3) Size and weight or weights of pipe to be caught
- (4) Flush or shoulder type (specify O.D. of shoulder – A)
- (5) Mandrel length desired (C)
- (6) Thread size and type of nut, if wanted. See page 8 for dimensions

RECOMMENDED SPARES:

(1) 2 Grapples for Each Catch Size

Packoff Assembly

Size – (inches) (please specify)	1-1/2 Tub	2-3/8 Tub	2-7/8	3-1/2	4 Tub	4-1/2	5 CSG	5-1/2 CSG	6 CSG	6-5/8 CSG	7 CSG	7-5/8 CSG	8	9-5/8 CSG	10-3/4 CSG	
			Tub	Tub		8-5/8										
			3-1/2	4		9-5/8										
			D.P.	Tub		9										
			4-3/4	CSG		CSG										
O.D. Adapter Sub (inches)	1-3/8	1-7/8	1-13/16	2-1/2	3-1/4	3-1/2	4	4	4-3/4	4-3/4	4-3/4	4-3/4	6-1/8	6-1/8	6-1/8	
Complete Assembly	Part No.	18835	9590	9595	9600	9605	9604	9610	9760	9775	9780	9615	9770	9620	9625	9765
	Weight	7-3/4	10-1/4	13	27-1/2	40	46	68	74	1000	104	114	120	181	210	216

Replacement Parts

Mandrel	Part No.	18837	9591	9596	9601	9606	9608	9611	9761	9776	9781	9616	9771	9621	9626	9766
	Weight	4	6	7	17	22	23	28	33	55	57	63	67	106	126	136
Adapter Sub	Part No.	18836	9592	9597	9602	9607	9609	9612	9612	9777	9777	9617	9617	9622	9627	9627
	Weight	3	3-1/2	4-3/4	8-1/2	15	19	34-1/2	34-1/2	38	38	40	60	60	58	58
Packing	Part No.	18838	10716	10047	16146	14036	13486	13764	13654	14714	15490	13427	14178	14965	10354	13197
	Weight	1/2	1/2	3/4	1	1-1/2	2	2-1/2	3	3-1/2	4-1/2	5-1/2	6-1/2	7-3/4	9	12
Thimble	Part No.	18839	6435	6436	16440	6696	18319	6448	16183	18321	15532	17542	6366	18242	17575	1478
	Weight	1/4	1/4	1/2	3/4	1-1/4	1-3/4	2-1/2	3	3-1/4	4-1/4	5	6	7	8	10

How to Order

Specify:

- (1) Name and part number of assembly or part
- (2) Top connection
- (3) Size and weight of pipe to be run in

RECOMMENDED SPARES:

- (1) 2 Packers for each size
- (2) 1 Thimble for each size

Standard and Oversize Packers

	Size	Weight (lbs)	Cup No.	Thimble No.
1-1/2" O.D. Tub	1-1/2" Tub	2.75		
No. 18835	1-1/2" Tub	2.90	18838	18839
2-3/8" O.D. Tub	2-3/8" O.D. Tub	4.00		
No. 9590	2-3/8" O.D. Tub	4.70	10716	
	2-7/8" O.D. DP	10.4	12993	6435
2-7/8" O.D. Tub	2-7/8" O.D. Tub	6.40	10047	6436
3-1/2" O.D. DP	2-7/8" O.D. Tub	6.50		
No. 9595	3-1/2" O.D. DP	13.30	14082	14085
	3-1/2" O.D. DP	12.40		
	3-1/2" O.D. DP	11.20	14960	6437
	3-1/2" O.D. DP	10.20		
3-1/2" O.D. Tub	3-1/2" O.D. Tub	9.20		
4" O.D. Tub	3-1/2" O.D. Tub	10.20	16146	16440
No. 9600	3-1/2" O.D. Tub	7.70	16370	
	4" O.D. Tub	11.00		
	4" O.D. Tub	11.60	14036	6696
	4" O.D. Tub	9.50	14034	
4" O.D. Tub	4" O.D. Tub	11.00		
No. 9605	4" O.D. Tub	11.60	14036	6696
	4" O.D. Tub	9.50	14034	
4-1/2" O.D. Tub	4-1/2" O.D. Tub	9.5 – 13.5	13486	18319
No. 9604	4-1/2" O.D. Tub	15.3 – 16.6		
	4-1/2" O.D. DP	18.10	10430	16297
5" O.D. Csg	5" O.D. Csg	13 – 15	13764	6448
No. 9610	5" O.D. Csg	18 – 21	13489	6754
5-1/2" O.D. Csg	5-1/2" O.D. Csg	13 – 15	13654	
No. 9760	5-1/2" O.D. Csg	15.5 – 17	30847	16183
	5-1/2" O.D. Csg	17 – 23	13657	
	6" O.D. Csg	14 – 18	16178	18233

Standard and Oversize Packers

	Size	Weight	Cup No.	Thimble No.
6" O.D. Csg	6" O.D. Csg	22 – 23	14714	18321
No. 9775	6" O.D. Csg	14 – 18	14721	8160
6-5/8" O.D. Csg	6-5/8" O.D. Csg	32 – 34	15490	15532
No. 9780	6-5/8" O.D. Csg	24 – 26	14962	18251
7" O.D. Csg	7" O.D. Csg	17 – 20	13427	
No. 9615	7" O.D. Csg	22 – 24	14232	17542
	7" O.D. Csg	26 – 30	13385	17543
	7" O.D. Csg	32 – 35.3	14723	18322
	7" O.D. Csg	38 – 40	14144	
7-5/8" O.D. Csg	7-5/8" O.D. Csg	26.4 – 29.7	14178	6366
No. 9770	7-5/8" O.D. Csg	29.7 – 33.7	16410	
8" O.D. Csg	8" O.D. Csg	26	14965	18242
8-1/2" O.D. Csg	8-1/8" O.D. Csg	32		
9" O.D. Csg	8" O.D. Csg	16		
No. 9620	8-1/8" O.D. Csg	28	16114	
	8-5/8" O.D. Csg	28 – 36		
	9" O.D. Csg	45	16110	17546
	8-5/8" O.D. Csg	36 – 40		
	9" O.D. Csg	55	16112	
	8-5/8" O.D. Csg	40 – 49	16114	
9-5/8" O.D. Csg	9-5/8" O.D. Csg	36 – 43.5	10354	17575
No. 9625				
10-3/4" O.D. Csg	10-3/4" O.D. Csg	32.7 – 55.5	13197	1478
No. 9765	11-3/4" O.D. Csg	38 – 60	14246	14248

Calculated Strengths

Grapple No.	Actual Catching Range		Old Nominal Size	Grapple O.D.	Tensile Strength of
	Minimum I.D.	Nominal* Catch Size	(Grapples were marked with this description)	- .000 + .005	Body Yield Strength (lbs)
16457	0.725	0.742	0.750	3/4" I.D. & 3/4" Extra Strong Pipe	0.770
	0.799	0.813	0.824	3/4" Std. Pipe 0.824" I.D.	0.844
	0.850	0.864	0.875	7/8" - 0.864" I.D. 1" - 2.25 # C.S. Hydril	0.895
	0.912	0.924	0.937	0.937" I.D.	0.957
	0.932	0.944	0.957	1" Extra Strong Pipe 0.957" I.D.	0.977
	0.955	0.967	0.982	0.982" I.D.	1.000
	0.975	0.987	1.000	1" I.D.	1.020
	1.033	1.049	1.058	1" Std. Pipe, 1.049"	1.078
	1.050	1.062	1.075	—	1.095
	1.100	1.112	1.125	1-1/8" I.D.	1.145
19352	0.913	0.937	0.957	0.957" I.D. - 1" Extra Strong Pipe	0.988
	0.956	0.978	1.000	1.000" I.D.	1.031
	1.005	1.027	1.049	1.045" - 1" Std. Pipe	1.080
	1.050	1.072	1.093	1.093" I.D.	1.125
	1.081	1.103	1.125	1.125" I.D.	1.156
11197 & 35843	1.137	1.170	1.207	1.187" I.D.	1.227
	1.180	1.215	1.250	1.250" - 1.219" I.D.	1.270
	1.211	1.246	1.281	1.281" - 1.250" I.D.	1.301
	1.242	1.277	1.312	1.312" - 1.281" I.D.	1.332
	1.273	1.308	1.342	1.343" - 1.312" I.D.	1.363
	1.332	1.367	1.402	1-3/8" I.D. - 1-1/4" Tubing	1.422
	1.394	1.429	1.464	1.438" I.D.	1.484
	1.430	1.465	1.500	1.500" - 1.469" I.D.	1.520
	1.580	1.615	1.652	1-1/2" Std. Pipe & 1-5/8" I.D.	1.672
	1.481	1.516	1.551	1.531" I.D.	1.571
	1.519	1.554	1.589	1-9/16" I.D.	1.609
	1.650	1.687	1.720	1.687" - 1.700" I.D.	1.740
	1.722	1.757	1.792	1-3/4" - 1-25/32" I.D.	1.812
	1.771	1.806	1.841	1.815" I.D.	1.861
	1.836	1.875	1.906	1-7/8" - 1-29/32" I.D.	1.936
	1.895	1.930	1.965	1-15/16" I.D.	1.985
	1.957	1.992	2.027	2" I.D.	2.047
	2.024	2.061	2.094	2.067" I.D.	2.114
9917 & 49372	1.441	1.470	1.500	1-1/2" Extra Strong Pipe (1.500" I.D.)	1.546
	1.553	1.583	1.610	1-1/2" Std. Pipe (1.610" I.D.)	1.658
	1.566	1.596	1.625	1-5/8" I.D.	1.671
	1.598	1.628	1.657	1.657" I.D.	1.703
	1.612	1.642	1.670	1.670" I.D.	1.717
	1.673	1.700	1.734	1.700" I.D.	1.781
	1.707	1.737	1.765	—	1.812
	1.742	1.772	1.800	1.800" I.D.	1.847
	1.817	1.847	1.875	1.7/8" I.D.	1.922
	1.881	1.911	1.939	1.939" I.D.	1.986
74555 & 9647	1.942	1.972	2.000	2" I.D.	2.047
	1.677	1.719	1.750	1.719" - 1.750" I.D.	1.781
	1.742	1.778	1.815	2-3/8" D.P. 6.65#	1.846
	1.802	1.838	1.875	1-7/8" I.D. & 1-27/32" I.D.	1.906
	1.864	1.900	1.937	1.875" - 1.937" I.D.	1.968
42071 17230 1348 & 42071	1.968	2.004	2.041	2-3/8" Tubing, 4.0# - 4.7#	2.072
	1.788	1.828	1.867	1.867" I.D. (Turn Body Down)***	1.898
	1.796	1.836	1.876	1.875" I.D. (Turn Body Down)***	1.922
	1.889	1.929	1.968	1.937" - 1.968" I.D.	2.015
	1.952	1.992	2.041	2-3/8" Tubing - 4# - 4.70#	2.078
	1.983	2.023	2.062	2.000" - 2.062" I.D.	2.109

Calculated Strengths

Grapple No.	Actual Catching Range		Old Nominal Size	Grapple O.D.	Tensile Strength of
	Minimum I.D.	Nominal* Catch Size	(Grapples were marked with this description)	- .000 + .005	Body Yield Strength (lbs)
	2.045	2.085	2.125 2-1/8" I.D. (Turn Body Down) ***	2.171	
	2.091	2.131	2.172 2-7/8" D.P., 9.75 - 10.4#	2.218	
	2.170	2.211	2.250 2-1/4" - 2-3/16" I.D.	2.296	
	2.186	2.226	2.266 2-17/64" I.D.	2.312	
	2.233	2.273	2.312 2-5/16" I.D.	2.359	
	2.249	2.289	2.329 2-7/8" O.D. D.P., 7.80# - 8.35#	2.375	
42071	2.295	2.335	2.375 2-3/8" I.D. NX 1/2 Drill Rod	2.421	
17230	2.358	2.398	2.438 2-3/8" I.D. & 2-7/16" I.D.	2.484	
1348	2.390	2.430	2.469 2-7/8" Tubing, 6.25 to 6.5, 2-7/8" O.D. 6.45# BX	2.515	132,000
&	2.420	2.460	2.500 2-7/16" I.D. & 2-1/2" I.D.	2.546	
42071	2.556	2.596	2.625 2-5/8" I.D. & 2-9/16" I.D.	2.671	
	2.608	2.648	2.688 2-5/8" I.D. & 2-11/16" I.D.	2.734	
	2.670	2.710	2.750 2-3/4" I.D.	2.796	
	2.921	2.961	3.000 3" I.D. & 2-15/16" I.D. NX Drive Csg.	3.046	
	3.046	3.086	3.126 3-1/16" I.D. & 3-1/8" I.D.	3.171	
	3.170	3.210	3.250 3-1/4" I.D. & 3-3/16" I.D.	3.296	
	3.264	3.304	3.344 3-11/32" I.D. & 3-9/32" I.D.	3.390	
	2.280	2.328	2.375 2-3/8" I.D. (Turn Body Down) ***	2.421	
	2.351	2.399	2.446 2-3/8" - 2-7/16" I.D. (Turn Body Down) ***	2.490	
	2.390	2.438	2.487 2-7/8" Tubing, 6.25 - 6.5# 2-7/8" D.P. 6.45#	2.531	
	2.468	2.516	2.563 2.562" - 2-15/32" I.D.	2.609	
	2.515	2.562	2.610 3-1/2" O.D., 15.5# D.P.	2.656	
	2.593	2.641	2.688 2-11/16" - 2-5/8" I.D.	2.734	
145017	2.671	2.718	2.766 3-1/2" O.D., 13.3 - 12.4# D.P.	2.812	
99888	2.718	2.766	2.814 2-13/16" I.D. & 2-3/4" I.D.	2.859	
1230	2.827	2.875	2.922 3-1/2" O.D., 10.2 - 11.2# D.P.	2.968	270,000
49888	2.843	2.891	2.938 2-7/8" - 2-15/16" I.D.	2.984	
&	2.890	2.938	2.992 3-1/2" O.D., 9.20# - 10.20# D.P.	3.031	
17233	2.984	3.032	3.079 3-1/2" O.D., 7.70# Tubing to 8.5# D.P.	3.125	
	3.030	3.078	3.125 3-1/8" - 3-1/16" I.D.	3.171	
	3.155	3.203	3.250 3-1/4" - 3-3/16" I.D.	3.296	
	3.297	3.345	3.392 3.340" - 3.382" I.D., 4" O.D., 12.50 - 15# D.P.	3.437	
	3.437	3.485	3.532 3-1/2" I.D.	3.578	
	2.532	2.579	2.625 3-1/2" O.D. D.P., 15.50#	2.671	
9947	2.671	2.718	2.764 3-1/2" O.D. D.P., 13.30 - 12.40#	2.812	
	2.829	2.875	2.922 3-1/2" O.D. D.P., 11.20 - 10.20#	2.968	357,000
	2.985	3.032	3.078 2-1/2" O.D. D.P., 8.50#	3.125	
	2.881	2.933	2.992 3-1/2" O.D., 9.20 - 10.20 #	3.031	
	2.949	3.001	3.068 3-1/2" O.D., 7.70 - 9.20#	3.109	
9412	3.021	3.073	3.125 3-1/8" I.D.	3.171	
&	3.146	3.198	3.250 3-1/4" - 3-3/16" I.D.	3.296	357,000
1582	3.256	3.308	3.364 4" O.D., 12.50 - 14 .00# D.P.	3.406	
	3.365	3.417	3.476 4" O.D., 11.00 - 11.60#	3.515	
	3.444	3.496	3.548 4" O.D., 9.50 - 11.00#	3.593	
	3.522	3.574	3.625 3.500" - 3.625" I.D.	3.671	
	3.584	3.636	3.687 3-11/16" I.D.	3.734	
	3.646	3.698	3.750 3-3/4" I.D.	3.796	
	3.218**	3.291	3.364 4" O.D., 12.50 - 14.00# Tubing (Turn Body Down) ***	3.406	
	3.327	3.400	3.476 4" O.D., 11.00 - 11.60# Tubing	3.515	
9487	3.406	3.479	3.548 4" O.D., 9.50 - 11.00# Tubing	3.593	
&	3.484	3.557	3.625 3-5/8" I.D. & 3-9/16" I.D.	3.671	530,000
532	3.608	3.681	3.754 4-1/2" O.D., 18.10 - 22# Tubing	3.796	
	3.671	3.744	3.826 4-1/2" O.D., 15.35 - 18.10# Tubing	3.859	
	3.812	3.885	3.958 4-1/2" O.D., 13.75 - 15.35# Tubing	4.000	

Calculated Strengths

Grapple No.	Actual Catching Range		Old Nominal Size	Grapple O.D.	Tensile Strength of
	Minimum I.D.	Nominal* Catch Size	(Grapples were marked with this description)	- .000 + .005	Body Yield Strength (lbs)
9487 & 532	3.874	3.947	4-1/2" O.D. 11.00 - 13.75# Tubing	4.062	530,000
	3.937	4.010	4-1/2" O.D., 9.50 - 11.60# Tubing	4.125	
	4.134	4.207	5" O.D., 18-21# Tubing	4.312	
	4.155	4.228	5" O.D., 17.70 - 18.00# Tubing	4.343	
	4.358	4.431	5" Tubing, 12.04 - 15# (4.408) I.D.	4.546	
	4.406	4.479	5" O.D., 11.5# Tubing	4.593	
17477 & 13202	4.874	4.947	5-1/2", 14 - 17# Tubing	5.062	725,000
	3.682	3.782	4-1/2" O.D. Tubing, 15.35 - 18.10#	3.921	
	3.761	3.861	4-1/2" O.D. Tubing, 13.75 - 15.35#	4.000	
	3.823	3.923	4-1/2" O.D. Tubing, 11.00 - 13.75#	4.062	
	3.886	3.986	4-1/2" O.D., 9.50 - 11.60# Csg.	4.125	
	4.073	4.173	5" O.D. , 18.00 - 21.00# Csg.	4.312	
16446 & 9682	4.214	4.314	5" O.D. , 15.00 - 18.00# Csg.	4.453	920,000
	4.307	4.407	5" O.D. , 12.64 - 15.00# Csg.	4.547	
	4.093	4.179	5" O.D. , 18 - 21# Csg.	4.312	
	4.234	4.320	5" O.D. , 15 - 18# Csg.	4.453	
	4.390	4.476	5" O.D. , 11.5 - 15# Csg.	4.609	
	4.469	4.555	5" O.D. , 9 - 13# Csg.	4.687	
	4.515	4.601	5" O.D., 8#, 5-1/2" O.D., 23-25" # Csg.	4.734	
	4.609	4.695	5-1/2" O.D., 20 - 23# Csg.	4.828	
	4.719	4.805	5-1/2" O.D., 17 - 20# Csg.	4.937	
	4.875	4.961	5-1/2" O.D., 14 - 17# Csg.	5.093	
	4.922	5.008	5-3/4" O.D., 19.5 - 22.5# Csg.	5.140	
	5.015	5.101	5-3/4" O.D., 17 - 19.5# Csg., 5-1/2" 9 - 13# Csg.	5.234	
	5.124	5.210	5-3/4" O.D., 14-17# Csg.	5.343	
	5.218	5.304	6" O.D., 20 - 23# Csg.	5.437	
58294 & 9717	5.281	5.367	6" O.D., 17 - 20# Csg.	5.500	1,175,000
	5.375	5.461	6" O.D., 14 - 17# Csg.	5.593	
	5.500	5.586	6-5/8" O.D., 32-34# Csg.	5.718	
	5.000	5.134	6" O.D., 23 - 26# Csg.	5.312	
	5.093	5.227	6" O.D., 20 - 23# Csg.	5.406	
	5.187	5.321	6" O.D., 17 - 20# Csg.	5.500	
	5.280	5.414	6" O.D., 14 - 17# Csg.	5.593	
	5.406	5.540	6" O.D., 10.5 - 14# Csg.	5.718	
	5.530	5.664	6-5/8" O.D., 28 - 32# Csg.	5.843	
	5.593	5.727	6-5/8" O.D., 26 - 29# Csg.	5.906	
	5.656	5.790	6-5/8" O.D., 24 - 28# Csg.	5.968	
	5.671	5.805	7" O.D., 38 - 40# Csg.	5.984	
	5.781	5.915	6-5/8" O.D., 20 - 24# Csg.	6.093	
	5.796	5.930	7" O.D., 33.7 - 38# Csg.	6.109	
17239 & 9268	5.875	6.009	6-5/8" O.D., 17 - 22# Csg.	6.187	972,000
	5.937	6.071	7" O.D., 29 - 33.7# Csg.	6.250	
	6.015	6.149	7" O.D., 26 - 29# Csg.	6.328	
	6.140	6.274	7" O.D., 22 - 26# Csg.	6.453	
	6.202	6.335	7" O.D., 20 - 23# Csg.	6.515	
	6.281	6.415	7" O.D., 17 - 20# Csg.	6.593	
	5.770	5.970	7" O.D., 30 - 40# & 6-5/8" O.D., 24# Csg.	6.218	
	5.895	6.095	7" O.D., 26 - 35# Csg.	6.343	
	6.020	6.220	7" O.D., 22 - 33.7# Csg.	6.468	
	6.270	6.470	7" O.D., 13 - 24# Csg.	6.718	
	6.364	6.564	7-5/8" O.D., 33.7 - 45# Csg.	6.812	
	6.567	6.767	7-5/8" O.D., 26.4 - 39# Csg.	7.015	
	6.864	7.064	7-5/8" O.D., 14.75 - 26.4# Csg.	7.312	
	6.987	7.187	8-1/8" O.D., 32 - 42# Csg.	7.437	
	7.225	7.425	8" O.D., 16 - 26# Csg.	7.673	
	7.239	7.439	7-9/16" I.D. Csg.	7.687	
	7.489	7.689	8-5/8" O.D., 36 - 48# Csg.	7.937	

Calculated Strengths

Grapple No.	Actual Catching Range		Old Nominal Size	Grapple O.D.	Tensile Strength of
	Minimum I.D.	Nominal* Catch Size	(Grapples were marked with this description)	- .000 + .005	Body Yield Strength (lbs)
17239 & 9268	7.755	7.955	8-5/8" O.D., 24 - 38# Csg. 9" O.D., 40 - 55# Csg.	8.203	972,000
	7.911	8.111	8-5/8" O.D., 17.6 - 29.35# Csg.	8.359	
	7.958	8.158	9" O.D., 34 - 45# Csg.	8.406	
	8.442	8.642	9-5/8" O.D. 43.5 - 53.5# Csg.	8.890	
9574	8.692	8.892	9-5/8" O.D. 29.3 - 42# Csg.	9.140	1,800,000
	7.102	7.245	8" O.D., 26# & 8-1/8" O.D., 32 - 42# Csg.	7.437	
	6.352	7.495	8" O.D., 16 - 26# & 8-1/8" O.D., 28 - 32.20# Csg.	7.687	
	7.537	7.686	8-5/8" O.D., 36 - 48# Csg.	7.875	
	7.759	7.902	8-5/8" O.D., 28 - 38# & 9" O.D., 45 - 55# Csg.	8.093	
	7.981	8.125	8-5/8" O.D., 17.5 - 29.35# & 9" O.D., 34 - 45# Csg.	8.343	
	8.435	8.578	9" O.D., 19# & 9-5/8" O.D., 43.5 - 58# Csg.	8.812	
9382 & 17245	8.790	8.833	9-5/8" O.D., 29.3 - 42# Csg.	9.125	1,946,000
	7.537	7.690	8-5/8" O.D., 36 - 48# Csg.	7.906	
	7.729	7.882	8-5/8" O.D., 28 - 38# & 9" O.D., 45 - 55# Csg.	8.093	
	8.009	8.162	8-5/8" O.D., 17.5 - 29.35# & 9" O.D., 34 - 45# Csg.	8.375	
	8.447	8.600	9" O.D., 19# & 9-5/8" O.D., 43.5 - 58# Csg.	8.813	
	8.535	8.688	9-5/8" O.D., 40 - 53.5# Csg.	8.906	
	8.760	8.913	9-5/8" O.D., 29.3 - 42# Csg.	9.125	
	9.479	9.632	10-3/4" O.D., 55.5 - 65.7# Csg.	9.843	
	9.760	9.913	10-3/4" O.D., 40 - 55.5# Csg.	10.125	
	9.885	10.038	10-3/4" O.D., 32.75 - 48.0# Csg.	10.250	
	10.729	10.882	11-3/4" O.D., 47 - 60# Csg.	11.093	
	10.854	11.007	11-3/4" O.D., 38 - 54# Csg.	11.218	
9283 & 20122 & 17248	12.228	12.381	13-3/8" O.D., 61 - 85# Csg.	12.593	2,700,000
	12.415	12.568	13-3/8" O.D., 48 - 68# Csg.	12.781	
	8.435	8.597	9-5/8" O.D., 47 - 58# Csg.	8.812	
	8.519	8.681	9-5/8" O.D., 40 - 53.5# Csg.	8.906	
	8.596	8.758	9-5/8" O.D., 36 - 43.5# Csg.	8.984	
	8.738	8.900	9-5/8" O.D., 29.3 - 42# Csg.	9.125	
	9.738	9.900	10-3/4" O.D., 40 - 55.5# Csg.	10.125	
	9.867	10.029	10-3/4" O.D., 32.75 - 48# Csg.	10.250	
	9.225	9.387	10-3/4" O.D., 71 - 76# Csg.	9.612	
	11.206	11.369	11.500" I.D. Csg.	11.594	
	10.581	10.743	11-3/4" O.D., 54 - 65# Csg.	10.968	
	10.832	10.994	11-3/4" O.D., 38 - 54# Csg.	11.219	
	10.612	10.774	11-3/4" O.D., 60# Csg.	11.000	
	10.675	10.837	11-3/4" O.D., 47 - 60# Csg.	11.062	
	11.643	11.805	13-3/8" O.D., & 11.937" I.D. Csg.	12.031	
	11.674	11.837	13-3/8" O.D., 96# & 11.975" I.D. Csg.	12.062	
	12.022	12.184	13-3/8" O.D., 72 - 92# Csg.	12.406	
	12.393	12.555	13-3/8" O.D., 48 - 68# Csg.	12.781	
	12.455	12.617	12-3/4" I.D. Csg.	12.834	
	13.143	13.305	14" O.D., 42 - 57# Csg.	13.531	
27782	13.312	13.474	13.599" I.D. & 13.609" I.D. Csg.	13.700	6,840,000
	13.330	13.492	13-5/8" I.D. Csg.	13.718	
	15.112	15.274	16" O.D., 55 - 75# Csg.	15.500	
	14.925	15.087	16" O.D., 65 - 84# Csg.	15.312	
	17.331	17.493	17-1/2" I.D. Csg.	17.718	
	18.862	19.024	20" O.D., 90 - 106.5# Csg.	19.250	
	12.097	12.259	13-3/8" O.D., 68 - 85# Csg.	12.484	
	12.390	12.552	13-3/8" O.D., 48 - 61# Csg.	12.781	

* Grapples are marked with this size.

** Mandrel is 3 1/4" O.D.

*** Mandrel, Release Ring,

Nut must be turned down 1/32" below minimum I.D.

The strengths shown are theoretical calculations based on yield strength of the material used in each case. The strengths shown are therefore accurate, plus or minus 20% of the figures shown, only. These figures do not constitute a guarantee, actual or implied. They are meant to serve as a guide only, and appropriate allowance must be made in use as a safety factor.

Alaska

4111 Ingra
Anchorage, Alaska 99503
United States
Phone: 907 563 5253
Fax: 907 561 0071

California

4117 Atlas Court
Bakersfield, California 99308
United States
Phone: 661 395 0165
Fax: 661 328 1827

Louisiana

108 Nova Drive
Broussard, Louisiana 70518
United States
Phone: 337 839 2400
Fax: 337 839 2211

190 Thompson Road
Houma, Louisiana 70363
United States
Phone: 985 851 1111
Fax: 985 851 1117

Mississippi

2930 Industrial Blvd.
Laurel, Mississippi 39440
United States
Phone: 601 649 8671
Fax: 601 649 8673

New Mexico

#14 CR 5860
Farmington, New Mexico 87401
United States
Phone: 505 326 4303
Fax: 505 326 4304

North Dakota

3202 1st Avenue West
Williston, North Dakota 58801
United States
Phone: 701 774 0091
Fax: 701 774 0092

Oklahoma

3800 Thomas Road
Oklahoma City, Oklahoma 73179
United States
Phone: 405 677 2484
Toll Free: 877 760 1711
Fax: 405 677 2457

Texas

1249 Commerce Road
Alice, Texas 78332
United States
Phone: 361 664 8013
Fax: 361 664 0462

8411 Irvington Boulevard*
Houston, Texas 77022
United States
Phone: 713 691 7800
Fax: 713 691 7807

2810 Highway 135 North
Kilgore, Texas 75662
United States
Phone: 903 984 2553
Fax: 903 984 7170

10720 West I-20 East
Odessa, Texas 79765
United States
Phone: 432 563 1173
Fax: 432 563 1182

30444 Southwest Freeway
Rosenberg, Texas 77471
United States
Phone: 281 341 5365
Fax: 281 344 1986

Utah

1553 East Highway 40
Vernal, Utah 84078
United States
Phone: 435 789 0670
Fax: 435 789 6568

West Virginia

Route 2, Murphy Run Road
Clarksburg, West Virginia 26301
United States
Phone: 304 622 4303
Fax: 304 623 2174

Wyoming

1283 N. Derrick Drive
Unit 1, Box 2
Casper, Wyoming 82604
United States
Phone: 307 237 3100
Fax: 307 237 2546

Canada

9120 – 34A Avenue
Edmonton, Alberta T6E 5P4
Canada
Phone: 780 702 5209
Fax: 780 463 2348

3550 93 Street*
Edmonton, Alberta T6E 5N3
Canada
Phone: 780 944 3929
Fax: 780 430 0760

1100 540 5th Avenue SW (Mailing)
1010 540 5th Avenue SW (Office)
Calgary, Alberta T2P 0M2
Canada
Phone: 403 250 8000
Fax: 403 294 5790

England

2 Isbourne Way
Winchcombe
Cheltenham
Glos, GL54 5NS
England
Phone: 44 (0) 1242 603975
Fax: 44(0) 1242 602614

Dubai

Nr. R/A 13, Daimler Chrysler Street
P.O. Box 61490
Jebel Ali Free Zone
Dubai
UAE
Phone: 971 4 8838776
Fax: 971 4 8838795

Indonesia

Cilandak Commercial Estate Unit 105
Jl. Raya Cilandak KKO
P.O. Box 7541
Jakarta, 12560
Indonesia
Phone: 62 21 782 6088
Fax: 62 21 782 6086

Scotland

10 Kirkton Avenue
Pittmedden Road Industrial Estate
Dyce, Aberdeen AB21 0BF
Scotland
Phone: 441 224 334800
Fax: 441 224 723034

Singapore

9 Tuas Avenue 5
Singapore, 639335
Singapore
Phone: 65 68611566
Fax: 65 68610728

Germany

Edesser Straße 1
31234 Edemissen Berkhöpen
Postfach 31232
Germany
Phone: 49 5176 97670
Fax: 49 5176 9767 22

* Denotes Manufacturing and Engineering facilities

Downhole Solutions
Drilling Solutions
Engineering and Project Management Solutions
Lifting and Handling Solutions
Production Solutions
Supply Chain Solutions
Tubular and Corrosion Control Solutions
Well Service and Completion Solutions
Corporate Headquarters

10000 Richmond Avenue
Houston, Texas 77042
United States
Phone: 713 346 7500
Fax: 713 346 7959